

DESCRIPTION OF REGION TEXAS STATE SENATE BILL 1 REGION B

1.1 Region B Overview

Senate Bill 1 of the 75th Texas Legislature was passed in 1997 to set the process of developing a comprehensive state water plan. To accomplish this task, the state was divided into 16 regional water planning groups. This report describes Region B as designated by Senate Bill 1. Region B is comprised of ten entire counties and a portion of one county in north central Texas. Specifically, those counties are Archer, Baylor, Clay, Cottle, Foard, Hardeman, King, Montague, Wichita, Wilbarger, and the City of Olney in Young County. Figure 1 shows the region, cities, towns, and the counties it encompasses.

Region B lies mainly in the Red River Basin, however, southern portions of Archer and Clay Counties lie in the Trinity River Basin, and southern portions of Archer, Baylor, and King Counties lie in the Brazos River Basin, as shown on the Surface Water Map in Figure 2.

In 1996, the total population of the region was reported to be 201,984, with the largest population center, the City of Wichita Falls, being 100,501 or 50 percent of the total. The second largest city was Vernon with a population of 12,481.

1.2 Population And Demographic Data

In general, most of the population is concentrated in eastern portions of the region with over one-half located in and around Wichita Falls¹. The January 1, 1998 estimated population density of the region ranged from a high of 200 persons per square mile (Wichita County) to a low of less than one person per square mile (King County). Regional population is forecasted to increase by 10 percent over the study period. The forecasts of projected populations will be examined in more detail in Chapter 2 of this report. Table 1-1 shows the 1990 census population by county and the corresponding estimated population in 1998. Tables 1-2 through 1-5 give a more in-depth breakdown of the regional demographics.

Table 1-1: County Populations^{2,3}

County	Area (sq. mi)	1990 Population	Est. 1998 Population	% Change	Density people/sq.mi.
Archer	910	7,973	8,688	9.0%	10
Baylor	871	4,385	4,326	-1.3%	5
Clay	1,098	10,024	10,872	8.5%	10
Cottle	901	2,247	2,106	-6.3%	2
Foard	707	1,794	1,852	3.2%	3
Hardeman	695	5,283	5,006	-5.2%	7
King	912	354	335	-5.4%	< 1
Montague	931	17,274	18,191	5.3%	20
Wichita	628	122,378	127,975	4.6%	204
Wilbarger	971	15,121	15,349	1.5%	16
Average	862	18,683	19,470	1.4%	31

Note: The City of Olney is not included in this table.

The following tables describe the demography of the region as of the 1990 census.

Table 1-2: 1990 Demographics – Breakdown by Race³

County	Percentage Of Population That Is...				
	White	Black	Hispanic	Native	Asian
Archer	97.7%	0.1%	2.4%	0.5%	0.1%
Baylor	90.4%	4.0%	7.6%	0.2%	0.3%
Clay	97.3%	0.3%	2.4%	0.9%	0.2%
Cottle	82.5%	8.9%	16.3%	0.2%	0.2%
Foard	86.5%	4.9%	13.0%	0.6%	0.2%
Hardeman	83.8%	6.1%	11.1%	0.5%	0.3%
King	89.5%	0.0%	15.0%	0.0%	0.0%
Montague	97.5%	0.0%	3.2%	0.4%	0.1%
Wichita	83.7%	9.2%	8.6%	6.4%	1.5%
Wilbarger	79.4%	8.9%	14.5%	0.5%	0.5%
Young	93.9%	1.5%	6.4%	0.3%	0.3%
Average	89.3%	4.0%	9.1%	1.0%	0.3%

Table 1-3: 1990 Demographics – Breakdown by Age³

County	Percentage Of Population That Is Age...									
	<5 yrs.	5-17	18-20	21-24	25-34	35-44	45-54	55-64	65-74	75> yrs.
Archer	7.1%	20.8%	3.7%	3.7%	15.1%	14.1%	11.3%	10.1%	8.1%	5.9%
Baylor	6.3%	16.0%	2.9%	3.8%	11.4%	12.0%	10.3%	11.2%	12.7%	13.3%
Clay	6.3%	20.0%	3.1%	3.3%	14.0%	13.3%	11.9%	11.0%	9.1%	7.9%
Cottle	5.9%	19.8%	2.7%	2.9%	11.7%	11.2%	10.0%	11.6%	12.7%	11.5%
Foard	6.2%	17.7%	3.2%	4.0%	12.2%	11.4%	9.8%	10.2%	11.5%	13.8%
Hardeman	6.8%	19.3%	3.3%	3.7%	11.9%	11.5%	10.1%	10.3%	11.3%	11.8%
King	6.8%	24.0%	2.8%	4.5%	16.7%	17.5%	12.1%	9.3%	5.4%	0.8%
Montague	6.5%	18.1%	3.3%	3.8%	12.6%	12.1%	10.6%	10.9%	11.3%	10.7%
Wichita	7.6%	18.5%	6.1%	6.1%	17.3%	13.2%	9.3%	8.9%	7.1%	5.7%
Wilbarger	7.2%	19.2%	4.4%	4.5%	14.5%	12.7%	9.7%	9.2%	9.2%	9.6%
Young	7.2%	19.4%	3.2%	3.6%	14.6%	13.3%	10.0%	10.4%	9.1%	9.2%
Average	6.7%	19.3%	3.5%	4.0%	13.8%	12.9%	10.5%	10.3%	9.8%	9.1%

Table 1-4: 1990 Demographics – Breakdown by Income and Education³

County	Median Family Income	Percentage Of Population That...		
		Has High School Diploma or Better	Has Bachelor's Degree or Better	Has a Family Income Below Poverty Level
Archer	\$ 29,617.00	72.2%	12.3%	8.9%
Baylor	\$ 25,747.00	63.6%	10.3%	16.3%
Clay	\$ 27,901.00	68.9%	11.1%	9.1%
Cottle	\$ 21,799.00	51.8%	10.7%	22.1%
Foard	\$ 22,105.00	62.2%	11.2%	15.7%
Hardeman	\$ 24,705.00	62.8%	11.0%	14.8%
King	\$ 29,000.00	78.2%	24.5%	7.4%
Montague	\$ 22,948.00	63.6%	10.2%	15.1%
Wichita	\$ 28,799.00	75.1%	16.5%	12.5%
Wilbarger	\$ 25,603.00	62.9%	12.7%	15.5%
Young	\$ 26,563.00	60.7%	11.2%	11.9%
Average	\$ 25,889.73	65.6%	12.9%	13.6%

Table 1-5: 1990 Demographics – Breakdown by Occupation³

County	Percentage of Population That Works In...						
	Agriculture	Manufacturing	Trade	Finance	Health	Public	Unemployed
Archer	11.7%	9.2%	20.5%	4.8%	7.6%	4.2%	4.0%
Baylor	11.6%	7.8%	23.5%	5.0%	10.0%	3.9%	6.0%
Clay	9.9%	13.0%	19.4%	4.5%	9.0%	4.6%	5.0%
Cottle	26.1%	1.2%	15.8%	3.4%	6.2%	6.0%	5.9%
Foard	21.3%	8.3%	10.4%	4.6%	11.9%	6.6%	5.3%
Hardeman	15.9%	12.5%	20.3%	4.1%	10.8%	1.9%	8.8%
King	41.1%	0.0%	12.5%	2.1%	0.0%	7.3%	2.0%
Montague	5.5%	19.9%	19.9%	3.4%	7.7%	4.0%	5.6%
Wichita	1.6%	15.2%	23.1%	5.3%	11.6%	5.1%	7.1%
Wilbarger	9.1%	11.9%	16.8%	3.6%	20.4%	2.5%	5.3%
Young	6.4%	13.8%	18.5%	4.4%	8.1%	3.5%	5.9%
Average	14.6%	10.3%	18.2%	4.1%	9.4%	4.5%	5.5%

1.3 Water Use Demand Centers

The City of Wichita Falls is the largest demand center in the region. Other minor demand centers include Seymour, Henrietta, Quanah, Bowie, Nocona, Burkburnett, Electra, Iowa Park, Vernon, Olney, and Archer City. Table 1-6 below shows the population of these demand centers.

Table 1-6: Regional Demand Centers⁵

County	City	1996 Population	1996 Municipal Water Use (Ac-Ft)
Archer	Archer City	1,938	351
Baylor	Seymour	3,059	694
Clay	Henrietta	3,038	642
Hardeman	Quanah	3,300	720
Montague	Bowie	5,389	1,092
	Nocona	3,146	514
Wichita	Burkburnett	11,154	1,443
	Electra	3,397	557
	Iowa Park	6,941	1,192
	Wichita Falls	100,501	21,650
Wilbarger	Vernon	12,481	2,377
Young	Olney	3,365	719

While the population of Region B is only expected to reach near 220,000 by 2050, the Dallas-Fort Worth Metroplex, located just east of the region, is expected to top 8 million¹. The Texas Parks and Wildlife Department believes that it is this population that will impose increasing pressures on the water-based recreation and natural resources of the region.

“As the recreational demands of the Metroplex population grow, the water-based recreational resources of the study area will become more valuable to the people of the region. If the region’s water resources are conserved and appropriately managed, the economic value of water-based recreational resources will greatly exceed present value and have the potential to become a major component of the study area’s economy”

-Daniel W. Moulton and Alison Baird,
Texas Parks and Wildlife Department

As this enormous population center grows, the number of people willing to travel into Region B for recreational purposes will undoubtedly increase as well.

1.4 Water Supply and Use

Water providers have continuously strived to develop the water resources in Region B so that they can deliver potable water to the people, irrigation water to the farmers and ranchers, and water to promote industrial and economic growth. In 1910, the dam at Lake Wichita in Wichita County was completed, signifying the beginning of 90 years of water management for recreation, irrigation, and human consumption for north central Texas. In 1924, the dam at Lake Kemp was completed, making it one of the largest man-made lakes in the world⁴. The lake was originally designed for flood prevention and water supply, however, soon after construction, it was determined that its water was too saline to drink. This led to the discovery of natural salt-water springs in Foard, King, and Knox Counties which have caused the water in the Big Wichita and Pease Rivers to be very difficult to treat for human consumption, consequently it is only used for irrigation and steam electric power purposes today. This natural phenomenon has prompted the Red River Authority to initiate the Red River Chloride Control Project on the Big Wichita River. By building brine lakes and low-flow dams, the amount of dissolved solids and chlorides in the water has been reduced. As a result, water from Lake Kemp may be utilized for other uses. There are 10 significant lakes and 4 major streams that are used for water supply in the region.

Figure 2 - "Surface Water Map" shows the location of the major surface water sources in Region B. Charts 1-1, 1-2, 1-3, and 1-4 depict the annual stream flows at various USGS gauging stations which are shown on Figure 2. (NOTE: The number beside each chart represents the USGS gauging station shown on Figure 2.)

Table 1-7 shows the annual firm yield that a lake or reservoir can produce in a year, for each significant lake in Region B.

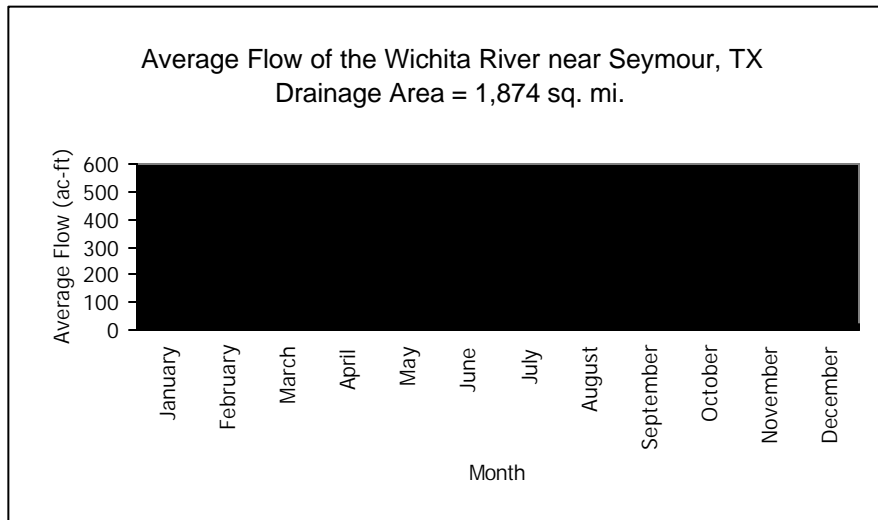
Table 1-7: Firm Yields for Lakes in Region B

Water Source	County	Lake Firm Yield (ac-ft)	Conservation Capacity (ac-ft)
Amon Carter Lake	Montague	2,600	20,050
Lake Arrowhead	Clay	29,532	262,100
Lake Diversion	Archer/Baylor	1,100	40,000
Lake Electra	Wichita	600	8,050
Lake Kemp	Baylor	116,000	319,600
Lake Kickapoo	Archer/Baylor	16,072	106,000
Lake Nocona	Montague	*1,260	*22,398
Millers Creek Reservoir	Baylor	n/a	30,700
Olney Lake	Young	1,260	n/a
Santa Rosa Lake	Wilbarger	n/a	11,570

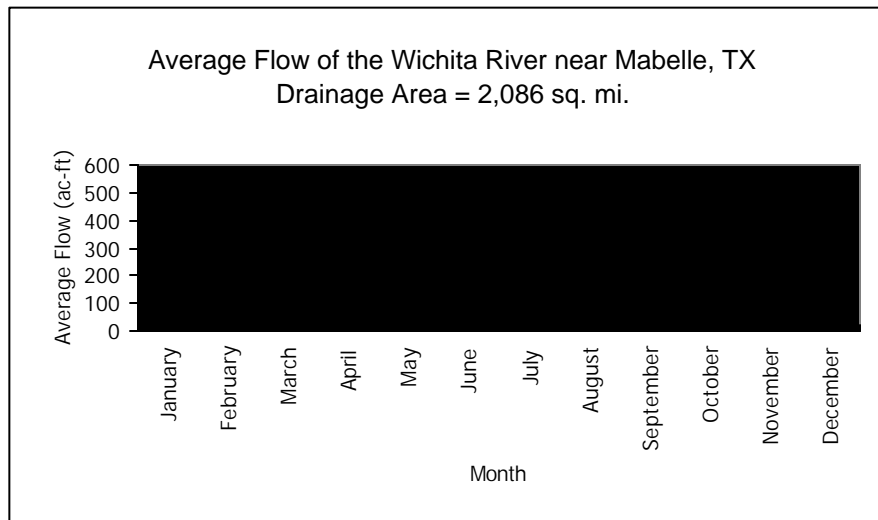
Sources: Texas Natural Resource Conservation Commission
1999 Texas Almanac

*1986 Freese and Nichols, Inc. Report

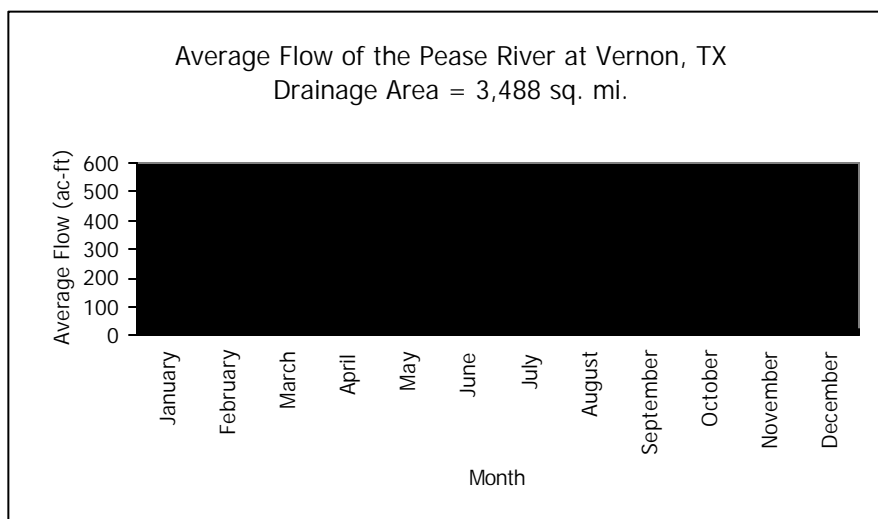
In addition to the lakes listed in the previous table, some municipalities and water supply corporations obtain their raw water from wells and springs. As of 1980, however, many of the wells and springs have ceased to flow, due mainly to over-pumping of the area's groundwater.



1

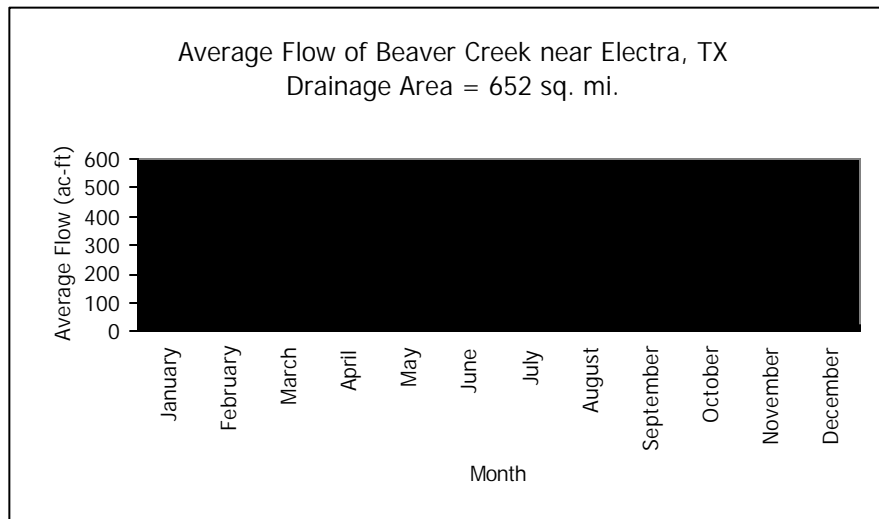


2

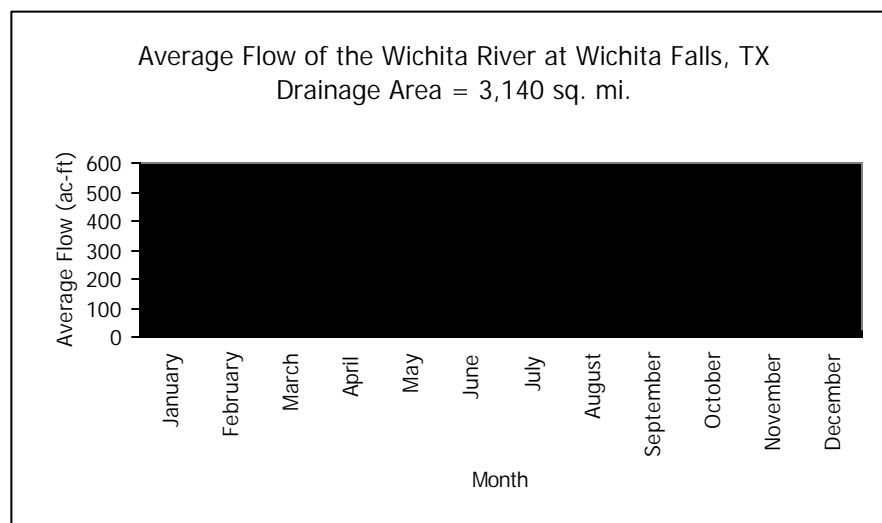


3

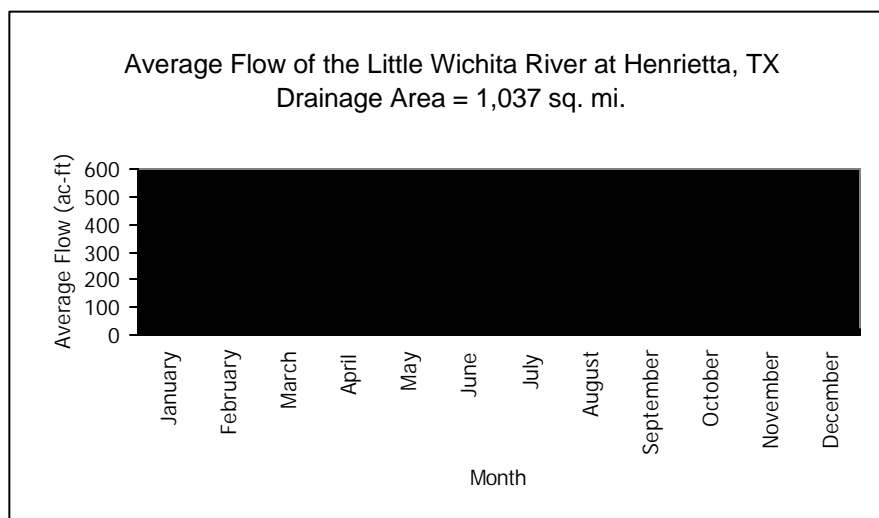
Chart 1-1
Average Stream Flow
1-9



4



5



6

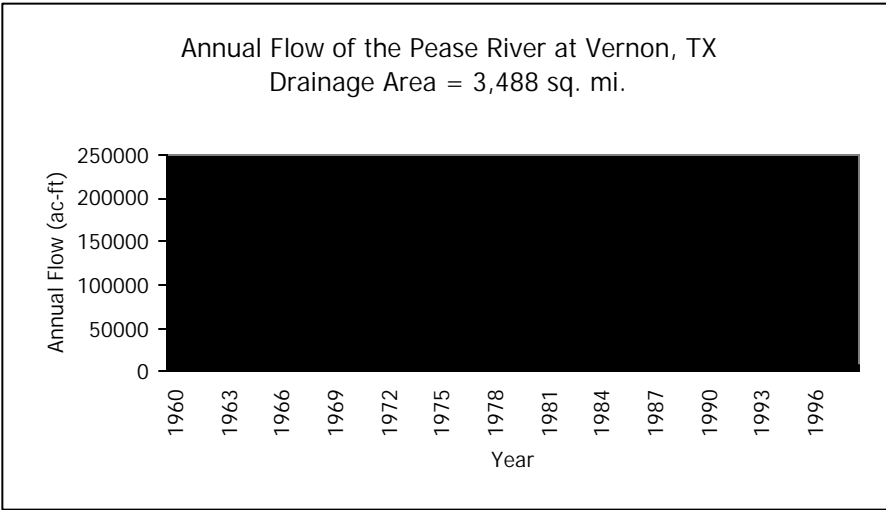
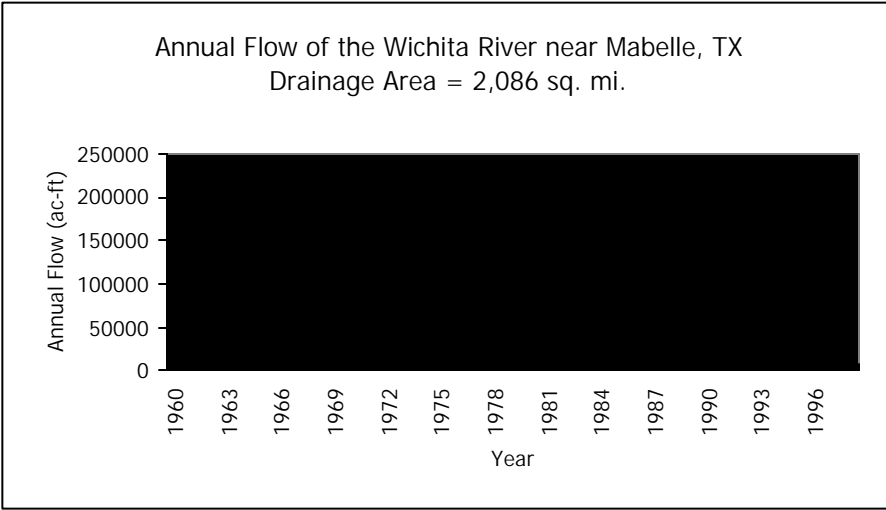
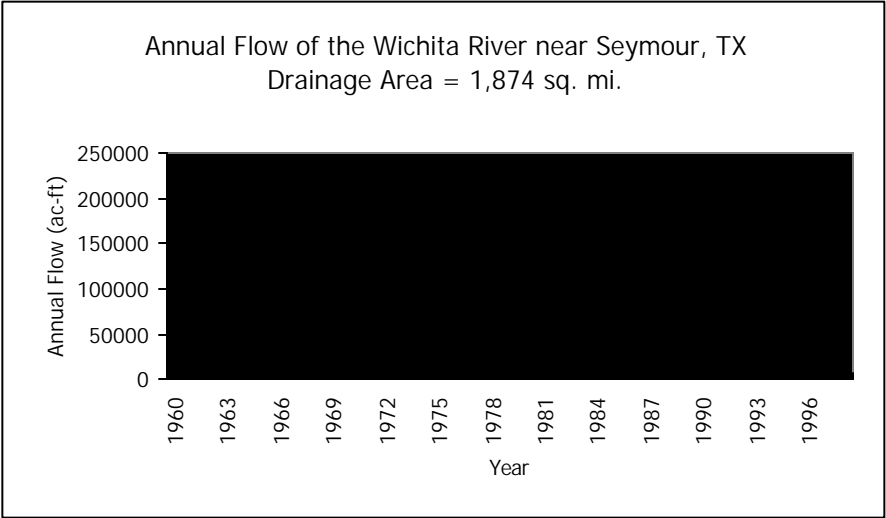
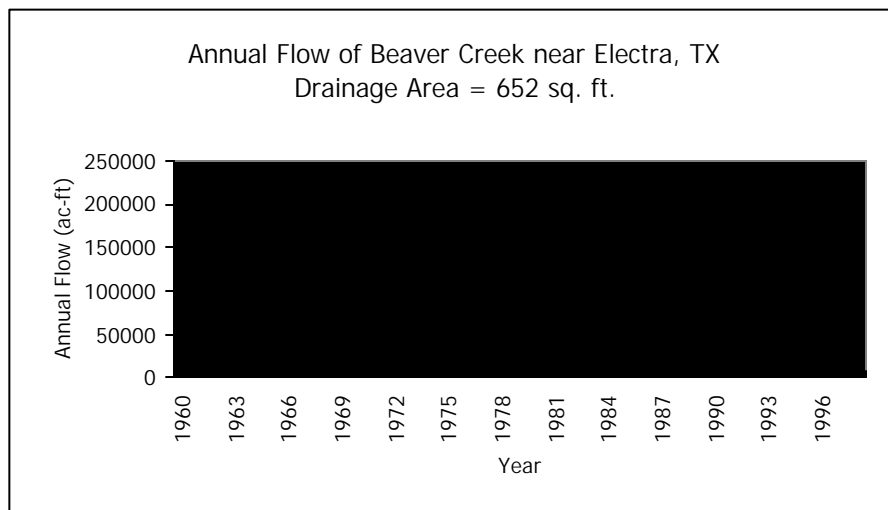
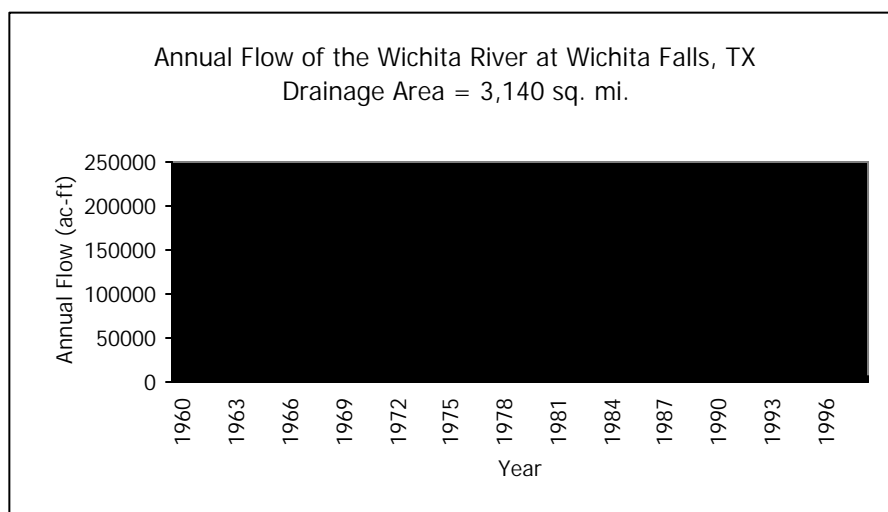


Chart 1-3
Annual Stream Flow
1-11

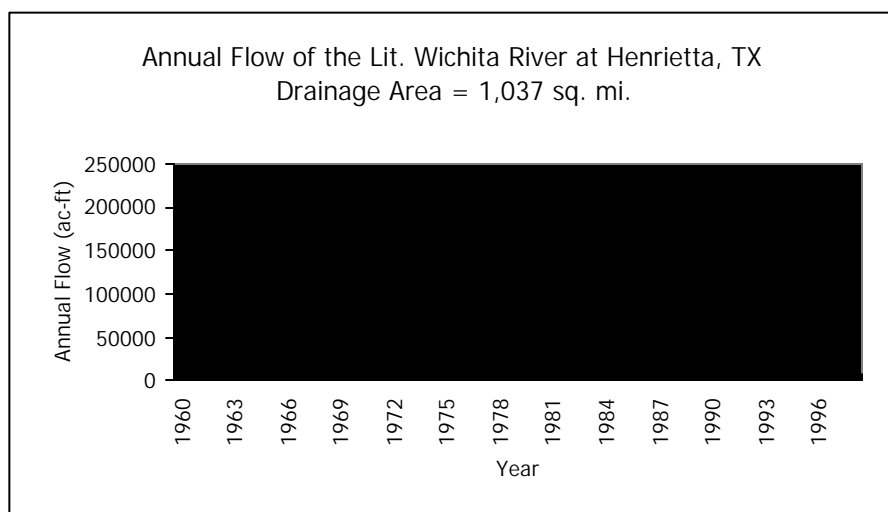
NOTE: Data obtained from the USGS was
incomplete for Gauging Sta. 1 & 3.



4



5



6

There are two major aquifers (Seymour & Trinity) and one minor aquifer (Blaine) in Region B. The Seymour Aquifer, found mainly in the western portions of the region, provided 151,765 acre-feet of water to the area in 1994. According to the Texas Water Development Board, 93 percent of this supply was used for irrigation purposes and most of the remaining supply was pumped for municipal use by the cities of Vernon, Burkburnett, Electra, and Seymour.

Extreme northern reaches of one of the state's most expansive aquifers, the Trinity Aquifer, lie in western and southern Montague County, the easternmost county in Region B. Water from this area of the aquifer is used mainly for irrigation purposes; due to its relatively low well yield. Figure 3 shows the location of the major aquifers within Region B.

Figure 4 shows the location of the only minor aquifer in Region B, known as the Blaine Aquifer. The Blaine Aquifer is found only in Cottle, Foard, Hardeman, and King counties of Region B, and nearly 98 percent of the water pumped from this aquifer is used for agricultural purposes.⁵ The water pumped from this aquifer is highly contaminated with dissolved solids from natural halite dissolution. In addition to the natural contamination, significant pollutants are also present in the aquifer as a direct result of oil and gas production.

Region B boast nearly 150 natural springs and seeps across the area.¹⁰ While some continue to produce water today, many of these springs have dried up over time due to over-pumping of the groundwater for municipal, agriculture, industrial, and mining use. While it is important to note that the use of springs for water supply is not common across the region, due to excessive amounts of chlorides and dissolved solids, there exists several springs that are still utilized for domestic agricultural, and mining supply. In addition, the smaller producing springs feed natural ponds and creeks that are habitat for many plants and animals. It should be recognized that any future development of underground sources of water, as well as the overuse of existing surface water supplies, may cause a widespread decline in the viability of existing springs. On the other hand, the creation of new surface water supplies such as lakes, ponds, canals, etc., will serve to replenish the underground water supply, rejuvenate existing or extinct springs, and possibly create new springs and seeps.

Agriculture is the main component of regional water use, accounting for 67 percent of all water used. Irrigation water is currently provided from Lakes Kemp and Diversion in unlined canals by the Wichita County Water Improvement District, the major irrigation provider in the region. A significant amount of irrigation is also provided from groundwater. Irrigation use in the region is expected to decline to 56 percent throughout the study period as more efficient pumping and irrigation techniques and equipment are being implemented across the region. Municipal use is expected to remain relatively constant due to conservation, while commercial and industrial use is expected to increase by nearly 260 percent. This significant increase is due to a proposed power generation plant in Archer County. The overall increase in water use in the region is projected to be about 10 percent throughout the study period. Figure 5 shows the actual water use by category for Region B in 1990 and 1996 as published by the Texas Water Development Board⁵. The 2050 projections are taken from Chapter 2 of this report.

Figure 5

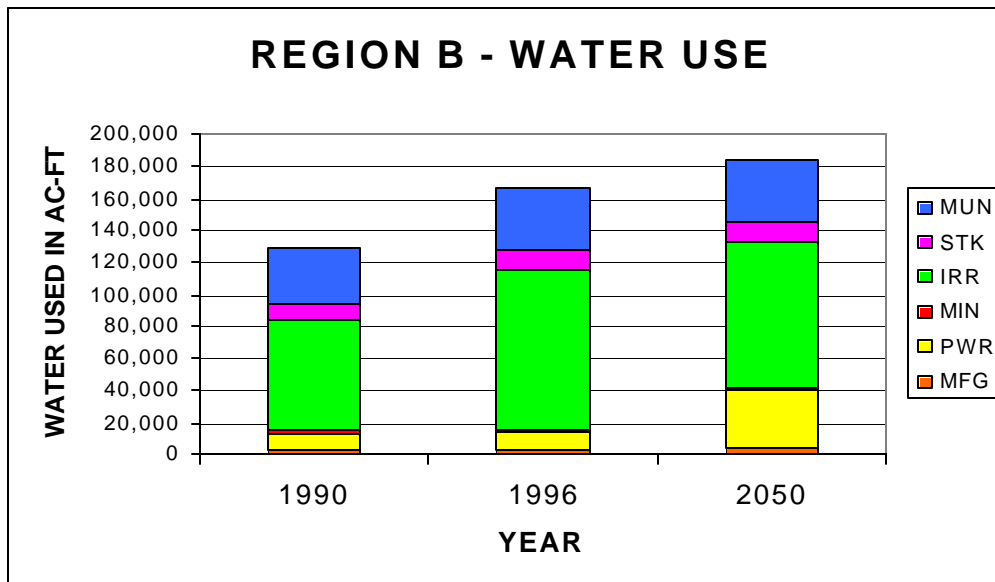


Table 1-8 shows the water rights holders of Region B and their permitted and actual usage.

Table 1-8: Water Rights Holders and Their Usage⁵

Rights Holder	Water Supply	Permitted Use (ac-ft)	Reported Use		
			1994	1995	1996
A.L. Rhodes	Little Wichita River	3,600	0	0	0
City of Bowie	Amon G. Carter	5,000	1,199	0	1,234
Peba Oil & Gas Co.	Red River	1,600	0	0	0
N. Montague Co. MWA	L. Nocona	1,260	597	563	599
Red River Authority	Truscott Brine Res.	3,050	0	0	0
Red River Authority	South Wichita River	8,780	4,838	5,489	5,104
Lonnie D. Allsup	Trib. Of Wichita River	2,150	360	360	360
City of Wichita Falls	Holliday Creek	7,950	0	0	0
Wichita County WID #2	Ls. Kemp & Diversion	193,000	60,572	50,490	35,720
W.T. Waggoner Estate	Ls. Santa Rosa & Wharton	3,070	324	353	314
City of Electra	L. Electra	1,400	693	307	440
City of Wichita Falls	L. Kickapoo	40,000	13,806	12,518	14,498
City of Olney	Ls. Olney & Cooper	1,260	649	604	0
City of Wichita Falls	L. Arrowhead	45,000	12,604	12,931	14,242
City of Wichita Falls	Little Wichita River	2,350	3,535	3,585	3,898
City of Henrietta	Little Wichita River	1,550	470	0	679
W. Tex. Utilities Co.	L. Pauline	7,140	3	0	4

A more detailed analysis of water use and water use projections is presented in Chapters 2 and 3 of this report.

1.5 Climate Data

The best way to describe the weather of Region B is volatile. It has the ability to change from one extreme to another in a short period of time. Annual precipitation can also vary greatly from year to year. The average annual rainfall for the region is 27.4 inches; however, the extremes range from 47 inches in 1919 to 12 inches in 1896⁶. Table 1-9 shows monthly averages and records for the Wichita Falls area and Table 1-10 lists temperatures and rainfall for each county in the region.

Table 1-9: Monthly Averages and Records for Wichita Falls⁶

Monthly Avg's	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temp.	52	57	66	76	83	92	97	96	87	77	64	55
Low Temp.	28	32	41	50	59	68	73	71	64	52	41	31
Dewpoint	28	31	37	47	58	64	65	64	60	50	38	30
Precipitation	1.04	1.46	2.21	3.01	4.07	3.52	1.72	2.48	3.82	2.74	1.54	1.29
Snowfall	2.0	1.9	0.9	Tr.	0.0	0.0	0.0	0.0	0.0	Tr.	0.3	1.1
Wind Speed	11.2	12.1	13.4	13.1	12.1	12.1	11.2	10.4	10.5	10.7	11.4	11.2
Monthly Rec's	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temp.	87	93	100	102	107	117	114	113	108	102	89	88
Low Temp.	-12	-8	6	24	36	50	54	53	38	21	14	-7
Precipitation	4.48	6.80	5.38	8.50	13.22	9.63	11.86	11.05	10.23	11.77	7.34	6.12

Table 1-10: Temperature Extremes and Average Rainfall⁶

	Temperature (of)		Annual Rainfall (in)
	Jan. Mean Min.	July Mean Max.	
Archer	29	98	29.3
Baylor	26	97	27.3
Clay	26	97	31.9
Cottle	25	96	22.3
Young	26	96	30.6
Foard	24	97	23.9
Hardeman	23	97	24.5
King	24	98	23.8
Montague	31	96	32.9
Wichita	28	97	28.9
Wilbarger	25	97	25.7

The region is obviously drier in the western areas and has more rainfall in eastern and southern counties.

Since 1930, the entire state has experienced 7 major droughts. Two of these droughts have occurred in the past 3 years, in 1996 and 1998. It has been predicted that between 15 and 30 percent of Texas farmers will quit the business this year due to recent droughts⁷. This fact is particularly significant for Region B since agriculture is a major contributor to the economy of the region.

1.6 Economic Aspects of Region B

The 3 main components of the region's economy are farming, ranching, and mineral production. As Table 1-11 shows, the market value of all agricultural products sold in the region is substantial, and the availability of water has a direct impact on this industry.

Table 1-11: Market Value of All Agricultural Products Sold

County	Value	Percent
Archer	\$ 63,394,000	21%
Baylor	\$ 38,007,000	13%
Clay	\$ 37,592,000	13%
Cottle	\$ 14,753,000	5%
Foard	\$ 11,108,000	4%
Hardeman	\$ 15,887,000	5%
King	\$ 6,598,000	2%
Montague	\$ 29,559,000	10%
Wichita	\$ 21,861,000	8%
Wilbarger	\$ 33,237,000	11%
Young	\$ 23,193,000	8%
Total	\$ 295,189,000	100%

The Texas Railroad Commission reports that Region B has over 33,000 producing oil wells and over 600 gas wells. Table 1-12 provides a tabulation by county of the current oil and gas wells.

Table 1-12: Number of Oil and Gas Wells^{8,9}

County	Oil Wells	Gas Wells
Archer	6,949	4
Baylor	472	1
Clay	2,319	81
Cottle	52	47
Foard	172	34
Hardeman	303	0
King	995	38
Montague	2,749	48
Wichita	11,820	4
Wilbarger	2,301	2
Young	5,058	379
Total	33,190	638

The service infrastructure is also strong. Some of the services offered throughout Region B include agribusiness, oilfield service, grain, fiber, and food processing. Wichita County, the most populous county in the region, is the retail trade center for a large area. Sheppard Air Force Base and medical services also are big contributors to the economy of Wichita County. The region boasts a variety of manufacturing. Some areas of manufacturing include oilfield equipment, clothing, building products, plastics, electronics, wood products, and aircraft equipment. Table 1-13 depicts the payrolls of each county in 1996.

Table 1-13: 1996 County Payrolls

County	Annual Payroll (\$1,000)
Archer	\$13,109
Baylor	13,211
Clay	17,721
Cottle	7,302
Foard	4,339
Hardeman	19,122
King	N/A
Montague	54,686
Wichita	960,436
Wilbarger	83,542
Young	105,266

1.7 Land Use

Region B includes some of the largest ranches in the state, including the Waggoner Ranch in Wilbarger County and the Four Sixes Ranch in King County. It has over 1 million acres of croplands and over 3 million acres of open range. Table 1-14 shows land use percentages for each county in the region (data for King County was unavailable). Percentages under the heading of “Conservation” represent lands that had previously been croplands, but have been converted to the Conservation Reserve Program. The Conservation Reserve Program, or CRP, subsidizes farmers and landowners to convert highly erodible farmland to permanent grassland for a period of ten years¹.

Table 1-14: Percentage of Land Use by County¹

County	Crops	Federal	Conservation	Pasture	Range	Urban	Water	Transportation	Total
Archer	16.2%	<0.1%	1.0%	1.6%	77.0%	0.9%	2.2%	1.1%	592.7
Baylor	29.0%	-	1.6%	1.7%	61.2%	0.7%	4.9%	0.8%	576.5
Clay	19.3%	-	0.6%	6.1%	67.9%	1.6%	3.1%	1.5%	708.6
Cottle	14.7%	-	12.7%	0.9%	65.3%	0.3%	2.1%	0.6%	578.6
Foard	21.2%	-	14.9%	-	62.4%	-	0.6%	0.9%	452.1
Hardeman	37.5%	-	15.4%	0.4%	42.2%	1.2%	1.7%	1.6%	444.7
King	9.7%	-	2.3%	0.4%	86.4%	0.0%	0.5%	0.6%	584.9
Montague	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wichita	40.5%	1.1%	1.5%	3.8%	38.7%	9.9%	1.5%	3.0%	391.9
Wilbarger	37.2%	-	7.3%	6.7%	46.6%	<0.1%	0.9%	1.3%	612.9
Young	30.6%	-	0.8%	2.7%	61.0%	1.6%	2.1%	1.3%	595.4

Typical crops in Region B include cotton, coastal bermuda, wheat, alfalfa, peanuts, grain sorghum, watermelons, pecans, peaches, and other various fruits. Cattle for beef and dairy production is the major component of the livestock industry, with sheep, swine, and equine also present¹.

1.8 Ecology and Wildlife¹

Most of Region B lies in the area known as the “Rolling Plains” with the exception of Montague County, which lies in the "Oakwoods and Prairies" area. The Texas Parks and Wildlife Department describes the “Rolling Plains” region as a “gently rolling plain of mesquite and short grass savanna.” The open range is generally characterized by its mesquite brush, prairie grasses, and sandstone outcroppings and cottonwood, hackberry, and saltcedar brush can be found near most rivers and streams. This vegetation is important to the survival of both resident and migratory birds. It is evident by the widespread mesquite, however, that over-grazing, soil erosion, and the lowering of the groundwater table have all contributed to the decline of the native grasslands. The topography of the region gently slopes to the east and southeast. The Red River and its major tributaries drain most of the region; however, extreme southern reaches of the region are drained by tributaries of the Brazos and Trinity Rivers.

The Texas Parks and Wildlife Department uses freshwater mussels as water quality indicators because they are usually the first organisms to show their sensitivity to changes in aquatic

quality. Recent surveys have determined that 52 separate species of mussels have declined¹. Another organism used to indicate water quality is the minnow. Since 1950, minnows native to the Big Wichita River System have also shown serious declines¹. These native minnows include the plains minnow, the silver chub, and the several varieties of shiner. The plains minnow is commonly used in support of a significant commercial baitfish industry. The decline of these organisms indicates poor water conservation and management. Runoff and scouring flows have increased with broad increases in over-grazing, highway development, and general land clearing. Scouring flows can cause excessive sedimentation, thus eliminating the natural habitats of these organisms.

The “Rolling Plains” region of Texas is not usually thought of as an area rich in wetland habitats. However, the region is actually very important to both migrating and wintering waterfowl. In fact many species of migrating shorebirds, raptors, and other birds stop over in the region to feed and rest on the available wetlands.¹

There are over 40 species of water-dependant reptiles, amphibians, and mammals that live in the study area. Some of these include minks, muskrats, and beavers, snakes, turtles, salamanders, and frogs. Fish species present in the study area include drum, carp, buffalo, bluegill, sunfish, largemouth, white, spotted, and striped bass, white crappie, flathead, blue, and channel catfish, and walleye. Lake Kemp supports a notable striped bass fishery. Some endangered species are also present across the region. Table 1-15 lists the endangered and threatened species present in the region.

Copper Breaks State Park located 12 miles south of Quanah in Hardeman County contains 1,889 acres, and a 70 acre lake. The park has abundant wildlife, and according to the 1998 Texas Almanac, is home for part of the official Texas Longhorn herd.

Table 1-15
Region B - Endangered/Threatened Species¹

SPECIES	STATE STATUS	FEDERAL STATUS
Reddish Egret	Threatened	
Peregrine Falcon	-	Endangered
American Peregrine Falcon	Endangered	Endangered
Arctic Peregrine Falcon	Threatened	Endangered
Whooping Crane	Endangered	Endangered
Bald Eagle	Threatened	Threatened
Brown Pelican	Endangered	Endangered
White-Faced Ibis	Threatened	-
Interior least tern	Endangered	Endangered
Black-capped Vireo	Endangered	Endangered
Shovelnose Sturgeon	Threatened	-
Texas Kangaroo Rat	Threatened	-
Black-footed Ferret	Endangered	Endangered
Brazos Water Snake	Threatened	-
Texas Horned Lizard	Threatened	-

1.9 Summary of Existing Local or Regional Water Plans

In April, 1999 surveys were sent to the water providers of Region B to determine, among other things, if they possessed a water conservation plan or a local or regional water plan. Table 1-16 lists the results of those surveys.

Table 1-16: Survey Results Regarding Water Plans

Water Provider	Existing Drought Contingency Plan?	Existing Water Conservation Plan?	Existing Local or Regional Water Plan?	Special Concerns of the Provider
Archer County MUD	Y	Y	N	Supply
Arrowhead Lake WSD	Y	Y	N	
Arrowhead Ranch Estates	Y	Y	N	
Baylor County WSC	N	N	N	Nitrates
Box CWSD	N	N	N	
City of Archer City	N	N	N	
City of Bowie	Y	Y	N	
City of Burkburnett	N	N	N	Nitrates
City of Byers	N	N	N	Nitrates
City of Charlie	N	N	N	Nitrates
City of Crowell	Y	N	N	Nitrates
City of Dumont	N	N	N	
City of Electra	N	Y	N	Nitrates
City of Henrietta	Y	Y	Y	
City of Holliday	N	N	N	
City of Iowa Park	N	N	N	
City of Lakeside City	N	N	N	Storage
City of Megargel	Y	N	N	
City of Nocona	N	N	N	
City of Nocona Hills	N	Y	Y	Nitrates
City of Olney	N	Y	N	Storage
City of Paducah	N	N	N	
City of Petrolia	N	N	N	
City of Pleasant Valley	N	N	N	
City of Quanah	N	N	N	
City of Saint Jo	Y	Y	N	
City of Scotland	Y	N	N	
City of Seymour	N	N	N	Nitrates
City of Sunset	N	N	N	Storage
City of Vernon	Y	Y	Y	Nitrates
City of Wichita Falls	Y	Y	Y	
Dean Dale WSC	Y	Y	N	
Farmers Valley WSD	Y	Y	N	
Foard County WSD	Y	Y	N	
Forestburg WSC	N	N	N	
Goodlett WSD	Y	Y	N	
Hinds CWSD	Y	Y	N	
Horseshoe Bend WSC	N	N	N	
Lockett WSD	Y	Y	N	
Medicine Mound WSD	Y	Y	N	
Northside WSC	Y	Y	Y	Nitrates
Quanah NE WSD	Y	Y	N	
Ringgold WSD	Y	Y	N	
South Quanah WSD	Y	Y	N	
West Texas Utilities	N	N	N	
Wichita Valley WSC	N	N	N	
Windthorst WSC	N	N	N	

The table shows that as of May 1, 1999 most providers did not have a drought contingency or water conservation plan that meets the new requirements of Senate Bill 1. However, as a part of the Senate Bill 1 planning efforts, most entities developed the plans as required.

1.10 Summary of Recommendations in the State Water Plan

The 1997 Consensus Texas Water Plan anticipates that Region B will have adequate water supplies throughout the planning period. The main recommendation of the Plan is to employ conservation measures to reduce water waste. Also, the heavy dissolved solid and chloride concentrations in the western portions of the region are preventing the full utilization of the available water resources. To reduce this, the 1997 Consensus Texas Water Plan recommends that the Red River Chloride Control Project, sponsored by the Red River Authority of Texas, continue to be funded and operated.

1.11 Identification of Known Threats to Agriculture or Natural Resources

Excessive concentrations of total dissolved solids, sulfate, and chloride are a general problem in most streams of the Red River Basin under low flow conditions. The high salt concentrations are caused, in large part, by the presence of salt water springs, seeps, and gypsum outcrops. Salt water springs are generally located in the western portion of the (Red River) basin in the upper reaches of the Wichita River, the North and South Forks of the Pease River, and the Little Red, which is a tributary to the Prairie Dog Town Fork of the Red River. Gypsum outcrops are found in the area ranging westward from Wichita County to the High Plains Caprock Escarpment".

The excessive amounts of dissolved solids and chlorides in the water present problems to managers, planners, and others concerned with water treatment for municipal use. For this reason, the quality of the available water supply is as much an issue as the quantity for Region B. Water consumers of all kinds, whether municipal, industrial, or agricultural, desire water that is less saline; however, these conditions have existed for many years, and the plants and animals that live with them have adapted well. The Red River Authority of Texas is sponsoring a federal chloride control project to control the natural chloride pollution in the Red River Basin by impounding high chloride waters from the natural brine springs. The planned reduction of the salinity will also reduce the base flow of water in the streams and rivers and may alter the aquatic

ecosystem. Consequently, these changes may cause the decline in the numbers of native organisms. In addition, as was previously noted, runoff and scouring flows have increased with broad increases in over-grazing, highway development, and general land clearing. These flows can cause excessive sedimentation, thus eliminating the natural habitats of the native organisms.

1.12 Water Providers in Region B

Water is provided in Region B by a number of entities. The cities provide most of the water in the region with the City of Wichita Falls providing the majority of the water. Other major providers include the Red River Authority of Texas and the Greenbelt Water Authority. The wholesale suppliers in the region are the City of Wichita Falls and the Greenbelt Water Authority. The following Table 1-17 shows a comprehensive listing of the water providers and the municipal use for the year 1996. A more detailed discussion of water use is presented in the next section of this report. It should be noted that these use figures do not include water for irrigation, manufacturing, electrical power, livestock, or mining.

Table 1-17: Water Providers and Users in Region B⁵

USER	COUNTY	RIVER	1996
		BASIN	DEMAND
			AF/YR
Archer City	Archer	RED	351
Holliday	Archer	RED	226
Lakeside City	Archer	RED	149
Seymour	Baylor	BRAZOS	694
Byers	Clay	RED	86
Henrietta	Clay	RED	642
Petrolia	Clay	RED	104
Paducah	Cottle	RED	239
Crowell	Foard	RED	216
Chillicothe	Hardeman	RED	165
Quanah	Hardeman	RED	720
Guthrie	King	RED	64
Bowie	Montague	TRINITY	1,092
Montague	Montague	RED	31
Nocona	Montague	RED	577
Saint Jo	Montague	TRINITY	139
Saint Jo	Montague	RED	47
Burkburnett	Wichita	RED	1,443
Electra	Wichita	RED	557
Iowa Park	Wichita	RED	1,192
Wichita Falls	Wichita	RED	21,650
Vernon	Wilbarger	RED	2,377
Olney	Young	BRAZOS	719
Other Rural			5,496
TOTAL			38,976

USER	COUNTY	RIVER	1996
		BASIN	DEMAND
			AF/YR
Baylor WSC	Archer	RED	18
Archer Co. MUD #1	Archer	RED	110
Megargel	Archer	RED	46
Scotland	Archer	RED	222
Windthorst WSC	Archer	RED	224
Wichita Valley WSC	Archer	RED	212
Archer Co. Other	Archer	RED	10
Archer Co. Other	Archer	TRINITY	9
Archer Co. Other	Archer	BRAZOS	19
Baylor WSC	Baylor	BRAZOS	187
Baylor Co. Other	Baylor	RED	27
Baylor Co. Other	Baylor	BRAZOS	25
Bellevue	Clay	RED	42
Bluegrove WSC	Clay	RED	7
Charlie WSC	Clay	RED	9
Dean Dale WSC	Clay	RED	262
Arrowhead Lake WSD	Clay	RED	95
Arrowhead Ranch WSD	Clay	RED	86
Friberg-Cooper WSC	Clay	RED	83
Clay Co. Other	Clay	RED	522
Clay Co. Other	Clay	TRINITY	52
King-Cottle WSC	Cottle	RED	422
Cottle Co. Other	Cottle	RED	10
Foard Co. WSD	Foard	RED	68
Margaret WSD	Foard	RED	12
Thalia WSC	Foard	RED	15
Foard Co. Other	Foard	RED	49

USER	COUNTY	RIVER	1996
		BASIN	DEMAND
			AF/YR
Goodlet WSD	Hardeman	RED	17
Medicine Mound WSD	Hardeman	RED	17
Quanah NE WSD	Hardeman	RED	59
S Quanah WSD	Hardeman	RED	18
Hardeman Co. Other	Hardeman	RED	98
King-Cottle WSC	King	RED	215
Dumont WSD	King	RED	51
King Co. Other	King	RED	2
King Co. Other	King	BRAZOS	3
Forestburg	Montague	RED	22
Montague WSC	Montague	RED	31
Nocona Hills WSC	Montague	RED	77
Oak Shores WSC	Montague	RED	4
Sunset WSC	Montague	RED	18
Ringgold WSC	Montague	RED	21
Montague Co. Other	Montague	RED	230
Montague Co. Other	Montague	TRINITY	614
Friberg Cooper WSC	Wichita	RED	83
Horseshoe Bend WSC	Wichita	RED	14
Pleasant Valley	Wichita	RED	96
Wichita Valley WSC	Wichita	RED	494
Dean Dale WSC	Wichita	RED	65
Box Com. WSD	Wilbarger	RED	19
Farmers Valley WSD	Wilbarger	RED	28
Harrold WSC	Wilbarger	RED	30
Hinds Com WSD	Wilbarger	RED	26
Lockett WSD	Wilbarger	RED	94
Northside WSC	Wilbarger	RED	31
Odell WSC	Wilbarger	RED	16
Oklahoma WSC	Wilbarger	RED	40
Wilbarger Co. Other	Wilbarger	RED	230

Note: Water use shown is for municipal purposes.

1.13 Major Water Providers

Senate Bill 1 requires that each regional water planning group designate its "Major Water Providers" (MWP) and develop data related to those entities. According to the rules, "An MWP is an entity, which delivers and sells a significant amount of raw water for municipal and/or manufacturing use on a wholesale and/or retail basis. The entity can be public or private (non-profit or for-profit). Examples include municipalities with wholesale customers, river authorities, and water districts." The designated "Major Water Providers" in Region B are:

- Greenbelt M & I Authority
- City of Wichita Falls

It should be noted that an entity designated as MWP receives no special consideration in the plan and that each water provider is on an equal basis. The data required to be provided for the MWP's simply aids in the accounting for the water of the region.

LIST OF REFERENCES

1. *Evaluation of Selected Natural Resources in Parts of the Rolling Plains Region of North-Central Texas*. Water Resources Team, Resource Protection Division, Texas Parks and Wildlife Department, 1998,
http://www.tpwd.state.tx.us/texaswater/sb1/wildlif/rolling/rolling_index.htm.
2. *1998 Total Population Estimates for Texas Counties*, Department of Rural Sociology, Texas Agricultural Experiment Station, Texas A & M University System, August 1999, http://txsdc.tamu.edu/tpepp/1998_txpopest_county.html.
3. *County and City Data Books*, Geospatial and Statistical Data Center, The University of Virginia, 1994, <http://fisher.lib.Virginia.EDU/ccdb/county94.html>.
4. *J. A. Kemp's Vision Helped Area Prosper*, Wichita Falls Times & Record News, Page 1A, 7A, August 25, 1998.
5. The 1997 Consensus Water Plan, The Texas Water Development Board, 1997.
6. *Climate Data for Wichita Falls, TX*, National Climatic Data Center, National Oceanic and Atmospheric Administration, July, 2000,
<http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll/wwDI~StnSrch~StnID~20025762#ONLINE>.
7. Interview with Susan Combs, Texas Agriculture Commissioner, Wichita Falls Times & Record News, Date Unknown.
8. *Oil Well Counts by County*, Oil and Gas Division, Texas Railroad Commission, February 2000, <http://www.rrc.state.tx.us/divisions/og/information-data/stats/ogowlct.html>.

9. *Gas Well Counts by County*, Oil and Gas Division, Texas Railroad Commission, February 2000,
<http://www.rrc.state.tx.us/divisions/og/information-data/stats/oggwlc.html>.
10. Brune, Gumar M. Springs of Texas, "Volume I" Ft. Worth: Branch-Smith, Inc., 1981.